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UNIMAS RESEARCH UPDATE

ON TARGET TO REALIZING UNIMAS AS A RESEARCH UNIVERSITY

Five years ago when UNIMAS proclaimed, as part of its mission and vision, its commitment to grow and carve fame as a 'research university', it was greeted with incredulity and suspicion. Clearly, being 'a new kid on the block' and dogged with problems of inadequate staffing, skeptics then sighed that UNIMAS was doomed to stagnation and there was no way in the world it could quickly emerge as a big player in research. However, not to be deterred, UNIMAS forged ahead. Today through strategic planning and sheer hard work of all its staff, a somewhat different picture had taken shape. Judging from the number of research projects that have been approved and supported through a variety of funding agencies, it can be confidently stated that a research culture has come of age at UNIMAS and is set to flourish even more. To date, a total of 146 research projects in a variety of strategically identified niche areas have been approved by the University Research Committee.

" Judging from the number of research projects that have been approved and supported through a variety of funding agencies, it can be confidently stated that a research culture has come of age at UNIMAS and is set to flourish even more..."

Research funding came from both internal and external sources including IRPA, Sarawak Government, MacArthur Foundation USA, Sarawak Shell, Petronas, Sapura, British Petroleum, Harvard University and Tun Jugah Foundation. Research publications in academic journals and conference proceedings generated by UNIMAS staff in the last five years climbed to almost 260 in total; covering a huge range of interests in the fields of medicine, environment, natural sciences, natural product chemistry, engineering, information technology, creative and applied arts, economics and business, cognitive sciences, social sciences, education and languages.

In 1996-97, UNIMAS staff was granted 12 research projects funded under IRPA to a sum total of RM4.9 million. Progress on all these projects has been most encouraging. Through IRPA funding UNIMAS has developed a strong research support to promote truly interdisciplinary and cross-faculty interactions and partnership. This creative strategy has succeeded in establishing a critical mass much needed to pursue meaningful and productive research in a predicament when only a small pool of expertise is available as currently experienced at UNIMAS. We are clearly on target in our effort to create a pool of high-quality researchers at UNIMAS who are able to interact fully and openly with other researchers, both nationally and internationally. The high quality and international character of UNIMAS research today has been reflected in the recognition and high profile accorded by the international scientific community to some of our research activities; especially in areas related to the molecular medicine of dengue and the biodiversity of coral reefs.

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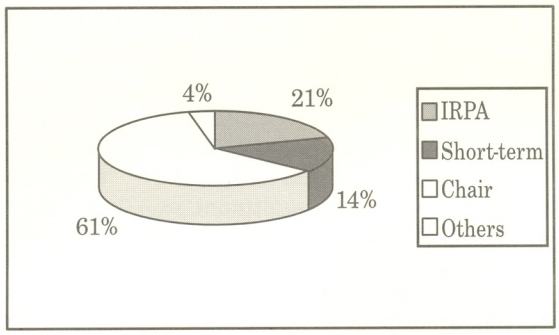
Total Grant Received
RM23,593,005.98



IRPA Grant
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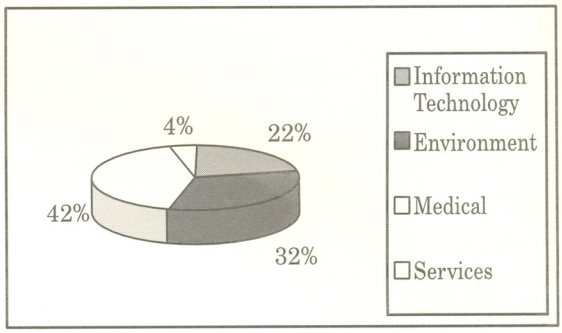

ENVIRONMENT

VITAL INFORMATION DATABASE FOR JUDICIOUS MANAGEMENT OF SARAWAK'S WATERSHED'S AND COASTAL ZONES

" Sediment studies are important in our attempt to shed light on the sources of water pollutants especially those caused directly by humans and types of land use for economic activities..."

Unimas researchers have been actively accumulating environmental data deemed vital for strategic and effective management of water catchment areas and coastal zones in Sarawak. Attempts to document the surface water quality of several rivers and dams have been initiated to include major river systems of Sg. Sarawak, Sg. Maong, Batang Rajang, Batang Ai Dam, Sg. Miri and the river systems in the Bario Highlands. Besides monitoring the water quality, characteristics of industrial effluents such as those discharged from paper mills and electronic industries were also determined. Studies on the heavy metal profile of the bottom sediment from Sg. Sarawak and Kuching Bay revealed high concentrations of arsenic, lead and mercury; particularly along some stretches of Sg Sarawak Kanan. This finding may be linked to the gold mining activities at Bau. The sediments were also analysed for n-alkane, polyaromatic hydrocarbons and pesticide residues. Such studies are important in our attempt to shed some light on the sources of water pollutants especially those caused directly by humans and types of land use for economic activities. Pesticide residues, particularly the organochlorines, are hazardous to aquatic life. Presently the UNIMAS research team is conducting a study to determine the fate of pesticides in Sg Maong to grasp a better understanding on the extent of pesticide pollution and its environmental impact on this critical catchment area in Sarawak

UNDERSTANDING HOW RAINFOREST REGENERATES A PREREQUISITE TO SUCCESSFUL REFORESTATION

"...only a comprehensive picture of succession processes at three different levels; namely at the landscape, community and species levels, can successfully guide us in our bid to reforest the degraded land areas back to their rich, diverse and productive forms again."

Natural and human-induced forest disturbances have rendered a huge area of our once resource-rich rainforests barren and unproductive. Massive reforestation of these degraded land areas however may still offer hope for restoring and rehabilitating the biological functions and products of our forests so that they can be utilized sustainably well into the future. In Malaysia however the detailed processes of forest succession and regeneration are poorly known. Scientists at our Institute of Biodiversity and Environmental Conservation (IBEC) realize the complexities of these processes with respect to the space and duration of time required for growth and development of both secondary and primary tree species involved in forest regeneration. Through a research grant provided by IRPA, they have initiated a study to understand the ecological constraints on the development of secondary forest in Sarawak. The study aims at understanding the detailed processes of succession at three different levels; namely at the landscape, community and species levels. It is felt that only a comprehensive picture of succession processes at all these levels can successfully guide us in our bid to reforest the degraded land areas back to their rich, diverse and productive forms again.

UNIMAS MONITORS 17% OF CORAL REEF SITES GLOBALLY UNDER REEF CHECK 97

"The effort involved more than 300 teams of scientists spanning five continents. In 1997 UNIMAS researchers surveyed over 2500km of Sabah coastline covering a total of 59 study sites at 28 separate coral reefs."

The year 1997 was designated as the UN International Year of the Reef (IYOR). One of the major international activities organised for IYOR is the extensive surveys of coral reef biodiversity to determine the health status on coral reefs on a worldwide scale. The effort involved more than 300 teams of scientists spanning five continents. In 1997 UNIMAS researchers surveyed over 2500km of Sabah coastline covering a total of 59 study sites at 28 separate coral reefs. This mammoth effort meant that UNIMAS surveys contributed over 17% of all the Reef Check 97 sites in the world. At every site, the overall picture of reef health and environmental threats were noted. Scientific inventorying of marine communities associated with coral reefs was carried out to include a myriad of species belonging to the corals and benthic life forms; macro-invertebrates and fishes. Data on species occurrence and abundance are currently being analysed to reflect the productivity and health status of our reefs in the global perspective.

DESTRUCTIVE FISHING PRACTICES CAUSING DISTRESS TO OUR CORAL REEFS

" ...there is still hope to reverse the trend of rapidly deteriorating state of Sabah's coral reefs through effective protection of the reefs."

Marine scientists from UNIMAS have established that the coral reefs of Sabah are presently under great stress, primarily as a result of destructive and unsustainable fishing practices. Cyanide and dynamite fishing are rampant in most of the reefs surveyed. On bombed reefs, fish diversity is reduced to less than half. There is evidence to show that damage to the corals due to these fishing practices can change the fish population structure with respect to fish size and abundance. This impact is most apparent amongst the larger valuable commercial fish species such as the humphead wrasse and large groupers. The study also indicate that the health of previously abused reefs around Pulau Sipadan can recover to almost pristine condition over a period of less than ten years. Thus there is still hope to reverse the trend of rapidly deteriorating state of Sabah's coral reefs through effective protection of the reefs. Unless urgent corrective measures are taken, the fisheries resources will eventually deplete leading to grave social and economic ramifications.

INFORMATION TECHNOLOGY

UNIMAS EXTENDS ACADEMIC ECOSYSTEM THROUGH VIRTUAL CAMPUS

"The major challenge is to provide wider opportunities and means of learning - anywhere, anytime, by anyone and concerning anything."

Higher education in the twenty-first century is expected to meet new needs of students who hail not only from schools and public sectors but also the private sectors. The industry now requires higher level training and retraining of its work force. Demand for higher education will be ever increasing and competition for places at university campuses will be more intense. Responding to this changing scenario, UNIMAS is already extending the parameters of its campus. The UNIMAS Virtual Campus Project funded by IRPA demonstrates the viability of setting up a virtual learning campus. Here the notion of an electronic learning environment or ecosystem is catching on like an infectious flu. The major challenge is to provide wider opportunities and means of learning - anywhere, anytime, by anyone and concerning anything.

Developments in educational and information technologies are helping to make this possible. These involve such features as the virtual classrooms, digital libraries, on demand just -in-time education, e-chat groups, MUDs/MOOs, e-workflows, etc. The UNIMAS project began with the formulation of 'learning units' as elements in a framework geared towards flexible curriculum development. Research has been carried into appropriate supporting technologies such as graphical browsers and dynamic links in second-generation hypermedia web servers. The project also addresses the role of IT in addressing the various aspects of tele-learning course management issues such as course registration, access to course materials, teacher-learner interactions, assessment and monitoring of students' progress etc.

SPECIES-SPECIFIC DNA PROBES USEFUL FOR TRACKING MALARIA VECTORS

"The DNA sequences are found to be species specific and therefore hold the potential of being used as population markers to track down and follow up the progress of malaria epidemics in the future"

In the past few years UNIMAS researchers have been hot on the trail of finding a useful means to track down malarial vectors during an epidemic. Much research efforts have been devoted to understanding the descriptive epidemiology of malaria and dengue in both Sabah and Sarawak. Only recently the interest of Dr Chang Moh Seng of our Faculty of Medicine and Health Science shifted to investigating the Anopheles vectors at the genetic level. This focus on the genetic diversity of malarial vectors has led to the isolation of a microsatellite DNA in a natural population of *Anopheles leucophyrus* and *Anopheles balabacensis*; two well known malaria vectors found in Sabah and Sarawak. These DNA sequences are found to be species specific and therefore hold the potential of being used as population markers to track down and follow up the progress of malaria epidemics in the future.

NEW RELIABLE METHOD SOUGHT TO WATCH OVER DENGUE

"Dengue continues to emerge as an increasingly important public health problem in other geographic areas of the world including India, Pakistan, Sri Lanka, Laos and China...."

While maintaining its dominant presence in Malaysia and other parts of Southeast-Asia, dengue continues to emerge as an increasingly important public health problem in other geographic areas of the world including India, Pakistan, Sri Lanka, Laos and China. This has been primarily attributed to our poor understanding of the population biology of dengue mosquito vectors and the transmission dynamics of the disease itself. Through a project supported by IRPA grant, a team of researchers at UNIMAS has been looking at improved means of watching out for mosquito vectors prior to and during a dengue outbreak. A tripartite collaborative research involving a comprehensive field study of scientists from James Cook University Australia, Sarawak Health Department and UNIMAS has succeeded in developing new *Aedes* indices that can be used for dengue vector surveillance. The next phase of study will be to test this new *Aedes* indices in the field for their sensitivity and reliability in predicting and controlling the outbreak of dengue.

TURNING ATTENTION TO DISEASES CAUSED BY CHANGING LIFESTYLES AND ALTERED ENVIRONMENT

"The incidence and prevalence of certain diseases associated with changing lifestyles and altered environments such as cardiovascular diseases, diabetes, cancer, adolescent psychosocial disorders and environmental health problems continue to rise to alarming proportions as we progress economically."

Rapid development, industrialization and urbanization have resulted in significant changes in the lifestyles of Malaysian population and subsequently induced changes in our disease patterns. The incidence and prevalence of certain diseases associated with changing lifestyles and altered environments such as cardiovascular diseases, diabetes, cancer, adolescent psychosocial disorders and environmental health problems continue to rise to alarming proportions as we progress economically. Under the promotion of Healthy Lifestyle Programme initiated and supported by IRPA research grant, some staff members of The Faculty of Medicine and Health Sciences UNIMAS have embarked on a host of community-oriented health issues that are holistic and multidisciplinary in approach. The initial focus has been to study the attributes, causes and prevalence of psychosocial problems in the ethnic populations in Sarawak. Only through a comprehensive understanding of the socio-behavioral aspects of these illnesses can intervention measures be instituted to reverse the rising trend in our community. Currently emphasis has been accorded to understanding the adolescent psychosocial problems, evaluation of the national cancer control strategies, behaviour modification among adolescent smokers and the family environment of problematic school-going delinquents.

TURNING ATTENTION TO DISEASES CAUSED BY CHANGING LIFESTYLES AND ALTERED ENVIRONMENT

"A significant proportion of our population however suffers from sleeping disorders that can lead to losses in terms of work productivity and other social obligations."

Sleep is a normal physiological process required by everyone. An adequate number of hours of quality sleep is a daily prerequisite for a normal productive day throughout our lifetime. A significant proportion of our population however suffers from sleeping disorders that can lead to losses in terms of work productivity and other social obligations. Insomnia is a sleep disorder defined as any degree of sleeplessness during the time when most people ordinarily sleep. Aside from being incidental to a number of illnesses, including fevers, heart conditions and certain brain disorders, insomnia may be due to a variety of causes. UNIMAS has set up a Sleep Research Laboratory at the Sarawak General Hospital to study both biological and environmental factors that could precipitate the onset of insomnia. The laboratory is equipped with state-of-the-art polysomnogram that enables monitoring and assessment of the patient's sleep architecture including the respiratory disturbance index (RDI) and the severity of apnoea. Currently research is being undertaken to provide insight into the association of obesity with insomnia and understanding the causes of daytime sleepiness in some patients.

RESEARCH UPDATE

DIAGNOSTIC KITS FOR JAPANESE ENCEPHALITIS

"Efforts are ongoing at UNIMAS to develop a vaccine that can limit the spread of the virus found in the natural mammalian reservoir, the domestic pigs, to the human population."

Japanese encephalitis is a disease of the central nervous system caused by a mosquito borne virus called JEV. In recent years this disease has emerged as an important public health problem in many parts of Malaysia including Sarawak. Our scientists at The Institute of Health and Community Medicine (IHCM) have been studying several aspects of the disease ranging from a fundamental understanding of its pathogenesis, the molecular epidemiology of JEV and intervention measures to control the disease. Of special concern has been the development of a rapid diagnostic test to confirm the infection. To date, the UNIMAS team has successfully completed the development and design of a diagnostic test that can accurately provide a laboratory confirmation of Japanese encephalitis in less than 24 hours. This test is being commercialized by our industrial partner, Venture Technologies Sdn Bhd., and already these kits have found their market niches overseas including Singapore, Vietnam and Cambodia. Efforts are ongoing at UNIMAS to develop a vaccine that can limit the spread of the virus found in the natural mammalian reservoir, the domestic pigs, to the human population.

USING DNA ENGINEERING METHODS TO COME UP WITH VACCINE FOR DENGUE

"By cloning pieces of various genes isolated from the virus, we have discovered that some of the regions in the surface of the virus play an important role in the inactivation of the virus."

There are four dengue viruses known to cause dengue fever and dengue haemorrhagic fever. UNIMAS industrial partner, Venture Technologies Sdn Bhd has already commercialized two different diagnostic kits that have been widely used to confirm dengue virus infection throughout the world. Today our main preoccupation at The Institute of Health and Community Medicine (IHCM) is to engineer new reagents for improving the two diagnostic kits already available on the market. Our current research strategy is to capitalize the knowledge gained from studying these reagents to design an effective vaccine against dengue virus infection. By cloning pieces of various genes isolated from the virus, we have discovered that some of the regions in the surface of the virus play an important role in the inactivation of the virus. We are now attempting to introduce the DNA coding sequences for these regions into various different types of bioengineered constructs in order to develop and test different types of vaccine options.

IMPROVING DIAGNOSIS OF MELIOIDOSIS - A POORLY KNOWN BUT FATAL DISEASE IN PEOPLE WITH WEAKENED IMMUNE SYSTEM

"We have found an antigen in the surface of Burkholderia pseudomallei which is unique to this bacteria and we are now attempting to clone the gene which codes for this antigen."

Melioidosis is a bacterial infection that can cause severe pneumonia and septicemia in individuals with weakened or compromised immune system. It is caused by a bacteria called *Burkholderia pseudomallei* commonly found in wet and muddy areas such as rice fields or river banks. The disease is often under-diagnosed because of the unavailability of a quick and reliable method to do so. Therefore when inflicted in individuals whose immune systems have been weakened by factors such as diabetes, severe burns, steroid therapy or old age, melioidosis can be highly fatal because of the delay or failure in diagnosis. In a preliminary survey of communities along the Rajang River done in 1994, we found that there was a high exposure of the population there to *Burkholderia pseudomallei*. No active case of melioidosis was encountered during the survey. It has been documented elsewhere however that asymptomatic infection by the causative agent may potentially develop into active forms of melioidosis when the immune system of the host is someway compromised. Therefore there is a clear need for a confirmative diagnostic tool to rapidly recognize active forms of the disease in such individuals. A research project funded by IRPA aims at developing a rapid diagnostic test for active melioidosis based on the organism's unique antigens. We have found an antigen in the surface of *Burkholderia pseudomallei* which is unique to this bacteria and we are now attempting to clone the gene which codes for this antigen. The availability of such test will improve the diagnostic capability of hospitals, particularly in rural areas where melioidosis is most likely to appear first.

INDIGENOUS CULTURE BETTER PRESERVED IN LONGHOUSES VISITED BY TOURISTS

"...promotion of cultural tourism in Sarawak has not only opened up new economic avenues through income generated from tourism..."

Tourism is increasingly gaining its importance as an industry in Sarawak. The two most valuable tourist assets in the State have been the indigenous culture and nature. Tourism can certainly serve as a precursor to change in the rural communities of Sarawak. It can potentially change the indigenous people's worldview and perception of themselves and others. However, concerns have also been expressed pertaining to adverse consequences of cultural tourism on some of the social values and cultural practices of our indigenous communities. Notwithstanding, a study of the impact of cultural tourism on the rural communities by UNIMAS social scientists has revealed surprising observations. Field investigations carried out at the most developed cultural tourism longhouses in the Skrang and Lubok Antu of Sri Aman Division clearly suggest that traditional cultural practices and social values among the native inhabitants are not only religiously preserved but also show no clear symptom of being undermined or eroded. Thus promotion of cultural tourism in Sarawak has not only opened up new economic avenues through income generated from tourism but also cultivated a keen interest among the ethnic communities to continue preserving their cultural heritage intact so as not to kill the goose that lays the golden eggs.

NEW BOOKS BY UNIMAS STAFF

BIODIVERSITY CONSERVATION IN ASEAN : EMERGING ISSUES AND REGIONAL NEEDS

ASEAN Academic Press (ISBN 1-901919-12-9)

EDITORS: Ghazally Ismail, Universiti Malaysia Sarawak
Murtedza Mohamed, Universiti Malaysia Sarawak

Asean countries today remain the last few parts of the world that are still endowed with vast areas of luxuriant and biologically diverse tropical ecosystems. However, unprecedented destruction of tropical rainforsets, coral reefs and mangroves in the past decades have driven hundreds of living species to extinction. Though Asean countries are aware of the predicament they are in and the ramifications they are about to face in the 21st century, they must also come to grips with the reality that their environmental agenda, more so than in other parts of the world today, is determined by economics. As developing nations, they constantly find themselves trying to maintain a balance between environment and economics and are constantly pressured to show their growth in the form of bottom lines.

In this book, renowned scientists and policymakers in Asean countries argue that each country has taken mindful approaches to addressing their specific and unique environmental and biodiversity conservation issues. They have demonstrated the emergence of a fresh mind-shift in responding to calls and demands for conservation measures and pollution abatement practices at both national and regional levels. Environmental consciousness and remedial measures to effectively stall and reverse the tide of environmental destruction in the region are likely to continue and produce desirable impacts on its economy and quality of life. These approaches are an essential part of Asean's collective efforts towards sustainable growth and development.

HERPETOLOGY BIBILOGRAPHY OF INDONESIA

Kreiger Publishing Company, Malabar, Florida (ISBN 1-57524-026-2)

AUTHOR: Indraneil Das
Institute of Biodiversity and Environmental Conservation (IBEC) UNIMAS

The archipelago of Indo-Malaya, stretching from the Andaman and Nicobar Islands, eastward to Timor, is the largest in the world consisting of approximately 14,000 islands. Much of the land area and associated coastal water fall within the political boundaries of a single nation, that of the Republic of Indonesia. This comprehensive bibliography includes all scientific papers, magazine and newspaper articles, books, book reviews, field/excursion reports, museum catalogues, bibliographies, chapters from books and theses known to the author that contain references to any species of amphibians and reptiles that occur in the region. Both terrestrial and aquatic taxa (including recent and fossil forms) are included. Languages in which the literature on the herpetology of the region has appeared include Bahasa Indonesia, Chinese, Dutch, English, French, German. Hungarian, Italian, Japanese, Latin, Polish, Portuguese, Russian and Spanish. Library work for this bibliography was conducted at the Sarawak Museum, Kuching, Malaysia; Brunei Museum, Bandar Seri Bagawan, Brunei Darussalam; University of Philippines, Los Banos , Philippines; Natural History Museum, London, United Kingdom; Museum National d'Histoire Naturelle, Paris, France; Centre for Herpetology, Madras Crocodile Bank Trust, Madras, India; Field Museum of Natural History, Chicago,USA; National Museum of Natural History, Smithsonion Institute, Washington DC, USA; Ernst Mayr (Museum od Comparative Zoology) and Widener Libraries of Harvard University, Cambridge,Mass, USA, as well as the personal library of Van Wallach, Cambridge, Mass, USA. The cut-off date for inclusion of entries was October 22, 1997.

IRPA GRANTS TO UNIMAS

PROJECT LEADERS	RESEARCH TOPICS	GRANT AMOUNT
1. Prof. Dr. Mary Jane Cardosa	Molecular approaches to determination of biomarkers for diseases and disease susceptibility and development of appropriate techniques for diagnosis	RM519,000.00
2. Prof. Steve Oakley	Evaluation and monitoring of marine communities in Sabah and Sarawak	RM290,000.00
3. Prof. Ghazally Ismail	Determination of Burkholderia pseudomallei unique peptides for the rapid diagnosis of melioidosis.	RM169,000.00
4. Prof. Dr. Mary Jane Cardosa	Recombinant oral vaccines against dengue virus infections: Determination of protective epitopes derived from structural and non-structural proteins of dengue virus.	RM250,000.00
5. Stuart James Davies	Rain forest succession in Sarawak: An intergrated rehabilitation of degraded forest using landscape community-and species-level studies.	RM394,232.00
6. Dr. Zani Assim	Distribution of biogenic and petrogenic hydrocarbons in coastal and estuarine environment of Sarawak.	RM427,000.00
7. Dr. Lau Seng	Assessment of the environmental changes in Sg. Sarawak catchment as a consequence of economic development.	RM505,112.00
8. Prof. Dr. Syed Hassan Almashoor	Determination and evaluation of the National Cancer Control Strategies.	RM63,385.00
9. Prof. Madya Hashami Bohari	Study the relationship between family and family health.	RM59,500.00
10. Prof. Syed Hassan Almashoor	Study on the family environment of school-going adolescents with conduct problem.	RM67,880.00
11. Jenny Maria Paul Subeh	Physchosocial problems and the psychological status of school going adolescents and their parents in Sarawak.	RM76,000.00
12. Dr Abdelhamid Abdesselam	Domain models and software development in the manufacturing industry information and command infrastructure.	RM525,000.00
13. Prof. Syed Hassan Almashoor	Investigation on the diagnosis and treatment of insomnia patients with sleep disorders at Sarawak General Hospital.	RM446,080.00
14. Prof. Mary Jane Cardosa	Upscalling, stability and field testing of kits for the diagnosis of Japanese Encephalities virus infection in swine and human	RM196,000.00
15. Dr. Chang Moh Seng	Improved surveillance and ecology of the dengue vectors Aedes aegypti(L) and Aedes albopictus (Skuse) (Diptera: Culicidae) in Sarawak.	RM237,000.00
16. Dr Spencer Empading Sanggin	Impact of tourism on longhouse communities in Sarawak.	RM200,000.00